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ABSTRACT

In the first phase of this study an interdisciplinary curriculum unit was developed centered on the concept of sustainable development in tropical rainforests. The centerpiece of the interdisciplinary unit was the investigation of a simulated environmental problem which required students to develop and then decide on a solution, having weighed a spectrum of possibilities previously explored in class activities and discussions. In the second phase of the study, nine science teachers implemented the curriculum unit in their classrooms after attending a two-day training workshop. Teachers first administered environmental decision-making pretests to their students who had been randomly assigned in intact classes to experimental (interdisciplinary rainforest curriculum unit) and control (conventional curriculum) groups. On completion of the three-week unit, environmental decision-making posttests were completed by both experimental and control students. Inferential results implied that students exposed to the interdisciplinary curriculum unit offered more supporting statements for their environmental decisions as compared to control students. It was evident that females used more alternative reasoning categories than their male counterparts when reaching an environmental decision. These results support the use of interdisciplinary curricula for enriching the environmental decision-making of secondary students. (Author)

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THE EFFECTS OF AN INTERDISCIPLINARY CURRICULUM UNIT ON THE ENVIRONMENTAL DECISION-MAKING OF SECONDARY SCHOOL STUDENTS[1]

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[1] *Running head: Interdisciplinary environmental curriculum unit*

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Abstract

In the first phase of this study an interdisciplinary curriculum unit was developed centered on the concept of sustainable development in tropical rainforests. The centerpiece of the interdisciplinary unit was the investigation of a simulated environmental problem which required students to develop and then decide on a solution, having weighed a spectrum of possibilities previously explored in class activities and discussions. In the second phase of the study, nine science teachers implemented the curriculum unit in their classrooms after attending a two-day training workshop. Teachers first administered environmental decision-making pretests to their students who had been randomly assigned in intact classes to experimental (interdisciplinary rainforest curriculum unit) and control (conventional curriculum) groups. On completion of the three week unit, environmental decision-making posttests were completed by both experimental and control students. This study's inferential results implied that students exposed to the interdisciplinary curriculum unit offered more supporting statements for their environmental decisions as compared to control students. It was also evident that females used more alternative reasoning categories than their male counterparts when reaching an environmental decision. These results support the use of interdisciplinary curricula for enriching the environmental decision-making of secondary school students.

Significance of the Study

The main goal of environmental education is to produce willing and responsible participants in environmental remediation and maintenance (Hungerford & Volk, 1990). Traditionally, the assumption about environmental education and associated issues has been that if persons are more knowledgeable they become more aware and are therefore more motivated to act responsibly. Although Hungerford and Volk (1990) acknowledge that in some cases this linear model of environmental awareness leading directly to action may be true, it has not been supported by recent research. In general, "issue awareness does not lead to behavior in the environmental dimension" (Hungerford & Volk, 1990, p. 17). Rather, environmental education researchers contend that instructional materials should provide opportunities for students to "develop the sense of ownership and empowerment so that they are fully invested in an environmental sense and prompted to become responsible, active citizens" (Hungerford & Volk, 1990, p. 17). A meta–analysis reported by Hines and co-workers (1986/87) showed that responsible environmental behavior is associated with an individual's investment in the environment through ownership and empowerment. Therefore, instead of merely increasing an individual's environmental knowledge, it is important to encourage environmental empowerment and ownership.

However, many instructional materials used in formal educational settings have been designed to provide information and therefore focus only on environmental awareness. Likewise, media efforts in environmental education have tended to focus on heightened awareness rather than on participation. Consequently, few individuals are exposed to or trained in the skills associated with environmental ownership and empowerment. Hungerford and Volk (1990) therefore advocate the need for an issue oriented (i.e., thematic, interdisciplinary) model of instruction in environmental education and suggest that this would facilitate the development of environmentally responsible individuals.

In 1969, Clay Schoenfeld (then editor of *The Journal of Environmental Education*) expressed concern over the lack of a structure for environmental education. Hungerford, Peyton

and Wilke (1980) reawakened this concern when they noted that curriculum development in environmental education was slow to progress from a venture based largely on intuition to one founded in research. Almost a decade later, Unesco–UNEP (1989) repeated the call that students be instructed beyond ecology basics and environmental awareness to become effective problem–solvers and decision–makers. Further, the importance of the transfer of environmental knowledge, skills, and attitudes acquired in the classroom to the learner's decision–making and problem–solving processes was restated. Unesco–UNEP also stressed the importance of teaching problem–solving in a variety of different, thought-provoking situations to facilitate the transfer process (Unesco–UNEP, 1989).

Purpose of the Study

One of the main goals of research in science education is to analyze the effects of curriculum and instruction on science learning (Good, 1992). The present study included the development and implementation of an interdisciplinary curriculum unit centered on sustainable development in tropical rainforests. With the active participation and advice of teachers, implementation occurred in secondary classrooms to establish the validity of the unit and to analyze the unit's effects on the environmental decision-making of secondary school students. This study was therefore seen as an investigation of an early step in the development of environmentally responsible individuals, based on the model of instruction in environmental education suggested by Hungerford and Volk (1990).

The following three research questions were posed as part of the quasi-experimental classroom evaluation of the interdisciplinary curriculum unit:

Question 1. Will an interdisciplinary tropical rainforest curriculum unit affect secondary school students' approach to solving environmental problems?

Question 2. Does gender play a significant role in secondary school students' approach to solving environmental problems?

Question 3. If gender does influence students' approach to solving environmental problems, will its influence remain the same after exposure to an interdisciplinary tropical rainforest curriculum unit?

Design and Procedures

Curriculum Development

The setting for the interdisciplinary curriculum unit developed in this study was constructed from environmental dilemmas which have recently received much public attention--those associated with tropical rainforest loss in developing countries. Fieldwork and extensive first–hand information gathering in the United States and various Latin American countries such as Costa Rica, Peru, Belize, and Puerto Rico was completed to collect real-world information and examples in the areas of politics and government policies, economics, and tropical rainforest organizations. Along with basic tropical rainforest ecology, the materials and information gathered during the data collection year were then assimilated into appropriate formats for an interdisciplinary curriculum unit targeted at the secondary school level. The components of this curriculum unit included the following topics:

(1) Introduction to Tropical Rainforest Resources: Biodiversity

(2) Tropical Rainforest Resources: Economic, Social, Moral, and Aesthetic Values/Ecological Services

(3) Introduction to the Problem of Tropical Rainforest Loss

(4) Extinction: Human Population Growth and Global Species; Extinction Rate

(5) Tropical Rainforest Ecology

(6) Sources of the Problem of Tropical Rainforest Loss: Ecological Characteristics

(7) Sources of the Problem of Tropical Rainforest Loss: Economics, Agricultural Practices, Logging Practices, Social Factors, and Government Policies

(8) Introduction to a Tropical Rainforest Simulated Problem

(9) Sustainable Development as a Balance of Alternatives

(10) What Can You Do?

The activities in the curriculum unit included a slide/tape presentation, three videotapes, student research and subsequent presentations, cooperative group assignments, student discussions, and teacher-facilitated note-taking.

Although the objectives of the proposed curriculum unit were not modeled directly from those proposed by Hungerford and Volk (1990), Hungerford, Peyton and Wilke (1980), and Unesco–UNEP (1989), they reflect similar philosophies. After its initial development, the rainforest curriculum unit was pilot–tested by an instructor teaching an introductory environmental science course for nonscience majors (Survey of Science, SE 1032) at Florida Institute of Technology. This instructor's constructive feedback, along with researcher observations of his classes provided a basis for revisions which were made to the unit.

Curriculum Validation

Since the second goal of this study was to validate the curriculum unit as usable by teachers and useful for students in enhancing their development of possible solutions to multifaceted environmental problems, it was appropriate and necessary to employ a classroom setting in the evaluation of the unit. A quasi-experimental pretest–posttest design was used in the evaluative component of this study. An overview of the design and flow of this study's experimental procedures is shown below in Figure 1.

Insert Figure 1 here

As can be seen from Figure 1, nine (three male and six female) secondary school teachers participated in a two-day inservice workshop as training for the implementation of the curriculum unit. About seven hours were spent in examining tropical rainforest ecology, and the social, political, and economic factors which drive rainforest loss. Selected case studies which illustrated the problems and possible long-term solutions to tropical rainforest loss were also investigated. Two further hours were spent by teachers and researchers cooperatively designing

the instrument used to gauge the complexity of students' decisions regarding environmental dilemmas (*Approach to Solving Environmental Problems*). Finally, researchers and teachers spent about two hours discussing, negotiating, and clarifying the procedures and design of this quasi-experiment. After attending the training sessions, teachers implemented the interdisciplinary rainforest curriculum unit in the experimental sections of their biology, environmental science, and ecology classes for the prescribed three-week period. The remaining sections of each teachers' classes served as the control group. The random assignment of treatment conditions to teachers' intact classes resulted in a total of 12 experimental and 12 control sections. The treatment therefore lasted for fifteen days (three school weeks with one day being the equivalent of one fifty minute class).

Sample

The study's sample consisted of the 591 students who attended the environmental science, biology, and/or ecology classes taught by the nine high school teachers who participated in the rainforest workshop. The sample was comprised of 297 females and 294 males. Subjects' ages ranged from 13 to 18 with a mean of about 15.5 years. A breakdown of the number of students in each type of course is shown in Table 1.

Insert Table 1 here

Generally, students who take environmental science or ecology classes choose these as science electives; this results in classes with a wide range of student abilities. The students in the environmental science and ecology classes participating in this study were described by their teachers as having average to basic learning abilities. On the other hand, students in 9th grade honors classes were described as having above average learning abilities. Basic biology classes were comprised of mostly average students. The study sample therefore consisted of a diverse

group of students at a variety of levels described by their teachers as having varying learning abilities.

Instrumentation

Students generally propose unidimensional (simple, possibly reductionist) solutions to complex environmental problems. The *Approach to Solving Environmental Problems* (ASEP) instrument was developed to measure the complexity of students' solutions by quantifying the degree of multidimensionality in their proposed solutions to a defined environmental dilemma. This was accomplished with an open-ended request for information which did not provide prompts or clues. The instrument requires students to make a decision regarding a contrived but realistic local environmental problem, and then to describe the factors which led to that decision. In conjunction with this researcher, the participants in the training workshop session developed the essay question in a cooperative setting. As assigned work from the first meeting, teams composed of two teachers were instructed to independently create an essay question which they thought would be appropriate and meaningful for their students. The teams were further instructed to take the scenario for this problem from an issue currently relevant to residents of Florida. Each team presented their scenario to the other teams during the second meeting of the workshop and these were recorded on an overhead transparency for view by all participants. The participants of the workshop chose the scenario which they thought was most appropriate and spent about one hour in reaching consensus as to the exact wording of the ASEP essay question (see Appendix A).

This instrument was administered as a pretest to both the control and experimental groups before implementation of the curriculum unit and as a posttest after completion of the curriculum unit. The essays were evaluated based on the number of supported reasons (ASEP supports) that students' offered when reaching a decision regarding the environmental dilemma. Each supported reason was awarded five points and no upper limit was imposed on this measure. Essays were also scored using the number of reason categories (ASEP alternatives) students utilized in reaching their decisions. Four broad categories were available to students: ecological,

economic, moral (including social), and aesthetic. Ten points were awarded for each reason category. Therefore the scoring of ASEP alternatives was done on a closed scale ranging from 0 to 40 (see Appendix A). To reduce the risk of experimenter bias, researchers did not score the essay responses. Instead, three independent scorers were hired to read and score the ASEP pre- and posttests. The scorers received approximately one and one-half hours of training. To insure a high degree of agreement among the three scorers, and to provide inter-rater reliability estimates, twenty eight essays were scored by all three scorers. The resulting three sets of ASEP scores were correlated in a pairwise manner according to suggestions by Sax (1989, p.272). The inter-rater reliability among the three scorers ranged from .70 to .80, with a median value of .80.

Treatment Verification and Teachers' Evaluations

Treatment verification was essential for this study as each teacher had both experimental and control classes. One researcher conducted observations in both experimental and control classes. In addition, each teacher completed a daily journal of activities for both experimental and control classes. A total of seventeen classroom observations were completed with eight of the nine teachers observed twice during the three weeks of curriculum implementation. An observation checklist was used to note the level of student participation, the teacher's role in the classroom, the teaching methodology and materials used in the classroom, and to verify the use of the curriculum unit. Examination of teachers' control group lesson plans, textbooks, and daily journals verified that the rainforest unit was not used in these sections.

Teachers' impressions regarding the curriculum unit comprised an integral part of both the curriculum implementation and the ongoing process of improving the unit. Lesson plan evaluation forms were distributed to the teachers for completion at the end of each lesson. Teachers were required to note the amount of time each lesson took to complete and whether or not the lesson was written at the appropriate level. Teachers also answered questions about the background reading, audiovisual materials, and lesson plan procedures contained in the unit. These questions were included to evaluate the success of each lesson while questions about specific overheads were designed to target the source of any perceived problems. Teachers were

also required to note students' overall reactions to each lesson as these can be good indicators of a lesson's success.

Results

Inferential Results

As it was possible that the amount of supporting evidence (ASEP supports) and variety of evidence categories (ASEP alternatives) students used in arriving at and justifying environmental decisions would be highly correlated, multiple analysis of covariance (MANCOVA) was the statistical tool of choice for the examination of this study's evaluative results. MANCOVA is an omnibus procedure which takes into account any correlation or variance overlap between outcome measures (ASEP supports and alternatives) in the estimation of main or interaction effects.

The results of this procedure are given in Table 2 below and indicate significant main effects for both treatment group (Wilks' L = .98; df = 2, 583; F = 6.51; $p < .05$), and gender (Wilks' L = .99; df = 2, 583; F= 4.39; $p < .05$), on the two aspects (supports and alternatives) of students' approaches to solving environmental dilemmas. The results presented in Table 2 further reveal that both age and ASEP pretest scores acted as useful covariates for the omnibus MANCOVA.

Insert Table 2 here

Follow-up univariate analyses of covariance (ANCOVA) and examination of covariate-adjusted means revealed that the treatment main effect was carried uniquely by ASEP supports and favored experimental (interdisciplinary) over control (conventional) students (experimental mean = 15.0; control mean = 13.0). On the other hand, similar analyses suggested that the gender effect seen at the MANCOVA level was carried exclusively by ASEP alternatives, and favored female students over their male counterparts (female mean = 17.0; male mean = 15.4). The results of the

univariate ANCOVAs are given in Table 3 below. When converted, these covariate–adjusted means yielded effect sizes (ESs) of 0.28 standard deviations for ASEP supports and 0.24 standard deviations for ASEP alternatives. Translated to percentiles, the experimental group "supported" their environmental decisions at the 61st percentile, on average, as compared to a control group at the 50th percentile. Also, females on average used alternative reason categories at the 59th percentile as compared to males at the 50th percentile.

Insert Table 3 here

Teachers' Evaluations of the Curriculum Unit

Since one of the primary goals of this study was the validation of a "teacher–friendly" curriculum unit which was useful in the classroom, teacher input was a critical part of the present study. Improvement of the unit was important, and teachers' evaluations offered excellent suggestions for future modifications to the unit. The evaluations also helped to describe the implementation process. Coupled with teachers' journals, researcher observations, and quantitative results, qualitative data from the teachers' evaluations helped the researcher gain insight into the effectiveness of the tropical rainforest curriculum unit.

The evaluation form used to collect teacher feedback comprised nine questions. Five questions (2, 3, 4, 6, and 7) required a "yes" or "no" response and four questions (1, 5, 8, and 9) elicited more detailed information. An average of seven teachers responded to the five "yes" or "no" questions. The majority of responses (93%) reflected that lessons were written at the appropriate level for the teachers' classes. An occasional comment indicated that a lesson may have been at the appropriate level but contained too much information. One of the teachers suggested an outline of the day's class notes for students to fill in as the teacher presented the overhead transparencies. This modification could help to alleviate the problem of information overload for students.

The teachers seemed to like having the lesson plan procedures written out as all (100%) of the responses for this question were positive. A few teachers noted that they liked the lesson plan procedures "very much" and liked "having planned presentations". One teacher noted that the procedures helped to keep "one organized." The background reading appeared to prepare the teachers for the lessons (96% responded positively to this question) although three negative responses were given by one teacher. This teacher did not offer additional feedback o. suggestions to improve the readings, but these three lessóns involved the simulated problem and may reflect that more background information was needed for the problem. Responses for the other lessons were favorable and the teachers noted that the background reading helped them prepare for teaching "very much" and that it was "very thorough," "excellent info" [sic], and "good."

Each lesson plan was originally developed to take approximately fifty minutes to complete. Evaluations revealed a range of lesson completion times, from 30 minutes to 114 minutes, but most (73%) lessons took 45 - 55 minutes to complete. A description of the main activities yielded similar responses, but one teacher seemed to prefer the lecture style of teaching when student group work was suggested in the lesson plan procedures. Teachers reported that student reactions to the unit ranged from liking a film very much to being bored with the notes. The heterogeneity of students' reactions seemed apparent on examination of students' responses to the lesson plans. According to the teachers, the students seemed to like the group work during the last week of the unit. In general, students did not seem to like the large amount of notes during the first week of the unit. According to one teacher, "low–to–average" ability students have a difficult time taking notes and listening. Another teacher had discipline problems and noted that these caused "content to be distorted." The last week of lessons seemed to be better for this teacher and this was reflected in more positive comments. The students in this class appeared to be less receptive to taking notes and reacted better to lessons which included group work.

Several teachers noted that good discussions were generated as a result of the materials used. One teacher noted a good discussion on the overuse and overharvest of tropical rainforest

products. According to the teacher, this student–generated discussion led to another "good" discussion on the sustainable use of rainforest products. Another teacher mentioned that the students had "good comments" and a good understanding of the concepts "despite the fact that the main activity was note–taking." A few teachers reported that the student presentations went well while others reported poor results with this first group activity. One of the teachers mentioned to the researcher that group work at the beginning of the school year was difficult and may not be a reflection of the curriculum unit, but rather a need for the students to learn how to work in groups. In general, the two remaining group activities seemed to be more productive and successful for the classes. One of the teachers noted that the students had an excellent discussion of their viewpoints of preservation, conservation, and development; "they were even talking about it going out the door!" Another teacher noted that the students began to "realize that their solutions did not always address the issues." This teacher stated that students' solutions were often simplistic and had the potential to be difficult to implement, but noted that some of the groups "did very well with their solutions" and seemed to have "grasped the situation well."

Overall, positive responses from the teachers indicated that the curriculum unit was useful in the classroom. Various suggestions were offered by teachers which will be used to make the unit more useful. Since many students lack basic ecological concepts, some teachers suggested the use of the unit later in the school year. This suggestion was offered by both the environmental science and biology teachers. Another good suggestion from some of the teachers was the incorporation of more activities during the different parts of the curriculum unit rather than mostly during the last week and a half. Further, because students have a tendency to "lose track" of information, and don't "see how it all fits together" one teacher suggested the use of more quizzes throughout the curriculum unit. Several other teachers mentioned the need for more grades, and one teacher was planning on a quiz for the students every third day on subsequent implementations of the curriculum unit. This teacher felt that quizzes would reinforce learning every third or fourth day. A different teacher noted the importance of including a set of quizzes in the unit because administrators prefer more grades in the gradebook during a grading period.

One of the teachers observed that low–to–average achieving students had a hard time reading information and extracting the important concepts. Specific pointed questions from one group to the next in a roundtable discussion format were suggested to help students recognize important information.

Conclusions

The inferential results presented allowed positive answers to the three questions posed in the evaluation of this interdisciplinary curriculum unit. Students exposed to the interdisciplinary curriculum unit (experimental students) did show quantitative differences in their approaches to solving environmental problems as compared to students not exposed to the unit. There were also quantitative differences in the approaches to solving environmental problems of males and females. Finally, a nonsignificant interaction effect provided weak evidence that the three–week tropical rainforest curriculum unit was equally effective for males and females.

Examination of significant main effects through protected univariate ANCOVAs showed that the treatment effect noted above was carried only in ASEP supports while the gender effect was manifested only in ASEP alternatives. Inspection of the covariate–adjusted means for the ASEP supports revealed a positive main effect for the curriculum unit in favor of the experimental group over the control group. On average, experimental students offered 11% more supporting statements for their environmental decision as compared to control students. Similar examination of the covariate–adjusted means for ASEP alternatives revealed a significant gender effect in favor of females. On average, when arriving at their environmental decision, females used 9% more alternative reasoning categories than did their male counterparts.

From a qualitative standpoint, and as described above, the teachers participating in this study suggested numerous solutions or options which have the potential to be beneficial in improving the rainforest curriculum unit. In a summary of the curriculum unit, one teacher stated that the information was very good and this teacher "learned a lot!" Another teacher described the unit as "excellent, one of the best I have ever used." Still another teacher noted that students expressed positive responses to the unit and that "they appreciate learning when they can see the

real world connection." These types of comments, along with their suggestions for improvement seemed to indicate that the teachers felt that the tropical rainforest unit was a useful addition to their current curricula.

Slavin (1989) has suggested that evaluations of innovative programs and new curricula be conducted in actual classroom settings. Realistic assessments of this type may prevent the perpetual pendulum swing commonly associated with curricular reform. This study provided evidence that it is possible to develop and investigate new science curricula in real classroom settings, with input from teachers, students, and experts in content and pedagogy. Teachers are indeed willing to take the time to participate as partners in science education research, and can provide invaluable feedback regarding their experiences in the classroom.

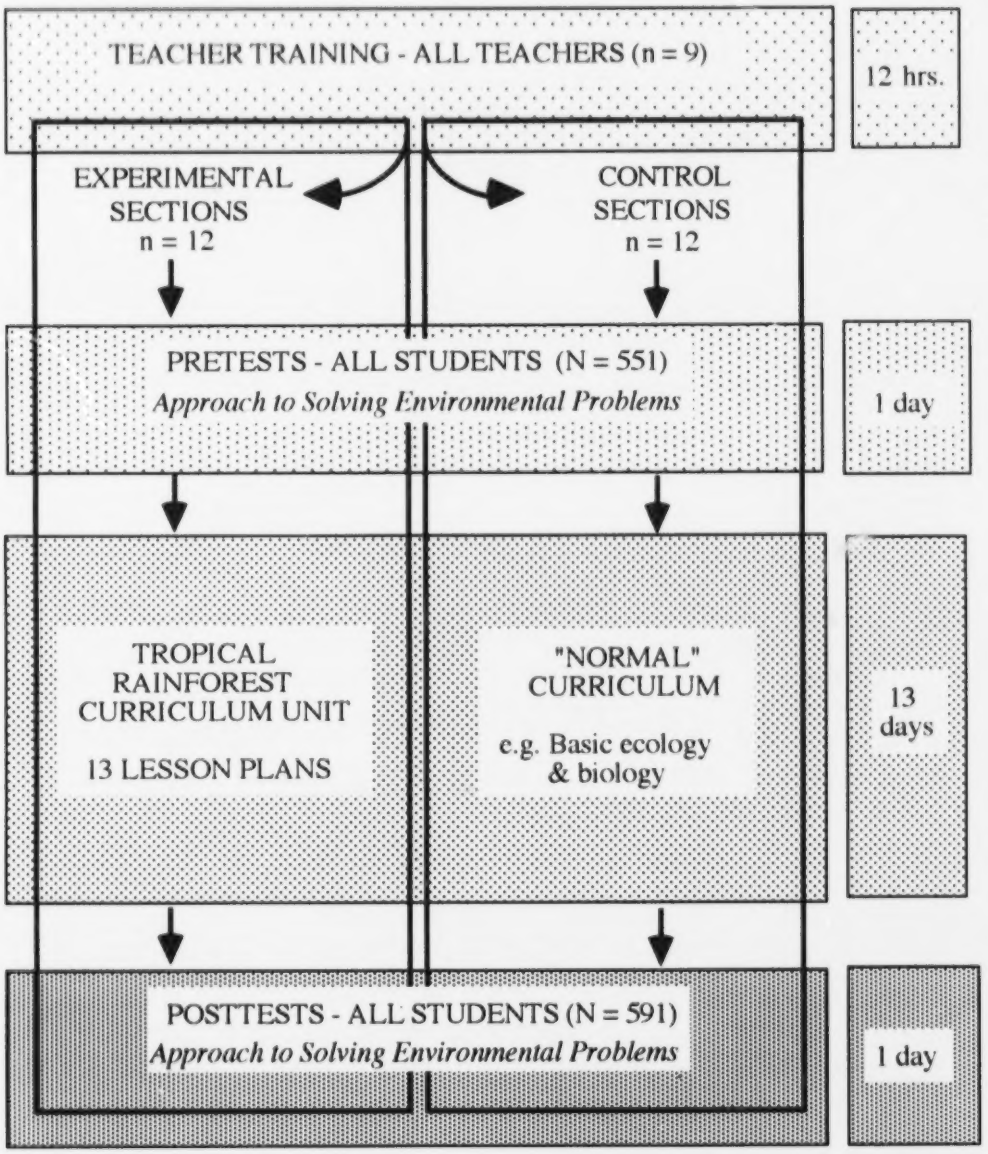
TEACHER TRAINING - ALL TEACHERS (n = 9)
12 hrs.
EXPERIMENTAL SECTIONS n = 12
CONTROL SECTIONS n = 12
PRETESTS - ALL STUDENTS (N = 551)
Approach to Solving Environmental Problems
1 day
TROPICAL RAINFOREST CURRICULUM UNIT
13 LESSON PLANS
"NORMAL" CURRICULUM
e.g. Basic ecology & biology
13 days
POSTTESTS - ALL STUDENTS (N = 591)
Approach to Solving Environmental Problems
1 day

Figure 1. Design and flow of the experimental procedures in the study.

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Table 1

Breakdown of the Number of Sections and Students in Each Course

	Total number of:	
Course description	Sections	Students
Environmental science/ecology	9	213
Biology	7	195
Honors biology	8	183
Total	24	591

Table 2

Multivariate Analysis of Covariance of ASEP Supports and ASEP Alternatives

Source of variance	Wilks' Lambda	Num. df	Den. df	Multivariate *F*
Set A (covariates)				
Age	0.92	2	583	24.93*
ASEP pretest	0.92	2	583	24.85*
Set M (missing data)				
Missing preASEP	0.99	2	583	2.13
Set B (group membership)				
Gender	0.99	2	583	4.39*
Group	0.98	2	583	6.51*
Gender*group	0.99	2	583	1.62

Note. N = 591.

*p<.05

Table 3

Follow-Up Univariate ANCOVAs of ASEP Supports and Alternatives

Source	df	MS	*F*	p
	ASEP Supports			
Covariates				
Age	1, 584	1800.5	31.87	.0001**
ASEP pretest	1, 584	1913.8	33.88	.0001**
Missing preASEP	1, 584	224.7	3.98	.0466
Group membership				
Gender	1, 584	74.8	1.32	.2505
Group	1, 584	624.6	11.06	.0009**
Gender*group	1, 584	114.8	2.03	.1546
	ASEP Alternatives			
Covariates				
Age	1, 584	0.0	0.00	.9910
ASEP pretest	1, 584	2196.9	44.75	.0001**
Missing preASEP	1, 584	29.8	0.61	.4360
Group membership				
Gender	1, 584	405.6	8.26	.0042**
Group	1, 584	37.8	0.77	.3803
Gender*group	1, 584	0.0	0.00	.9829

Note. N = 591.

**p<.025

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Appendix A

Approach to Solving Environmental Problems

Florida Environmental Problem

Grading Criteria

Three years ago many acres of undisturbed land located between Kirkman Road and Shingle Creek were sold to developers. This forest wetlands system represents an undisturbed area near an expanding tourist zone. The developers are planning to use this land for shopping centers and hotels.

You are a member of the county council and hold the deciding vote on whether or not to allow the proposed development. In effect, you must decide if this development is necessary for the well-being of the community.

State your decision (yes or no for the development project), and describe the factors which led to your decision. Write at least one page, but don't use more than two pages (front and back).

Scoring

1. Alphabetize the essays by the student's last name.
2. Score the essays using the following criteria:
   a. award 5 points for a valid supported statement.
   e.g. Two different essays have the following statements which supports their decision:
   The wetlands should be developed because building hotels and motels would provide jobs for people.
   The trees help 'purify' the air so the trees should be left alone.
   Each of these statements would receive 5 points.

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b. award 10 points for an alternate point of view (Economic (including potential products from the area), Ecological Services, Moral or Aesthetics argument).

e.g. If one essay has alternative points of view within the same paper, each alternative point of view would receive 10 points **in addition** to the 5 points awarded for a valid supported statement.

The wetlands should be developed because building hotels and motels would provide jobs for people (economic), but the trees help 'purify' the air so some trees should be left (ecological services).

The wetlands should not be developed because humans don't have the right to destroy the homes of animals (moral). Also, the trees help 'purify' the air so they should be left alone (ecological services).

Each of these examples would receive a total of 20 points.

c. **do not** count off for misspelled words, poor grammar, or messy writing.

d. record the student's name, ID, and score on the grading form.